~~COMPOUNDS,~~ DERIVATIVES, IMMUNOGENS, AND ANTIBODIES, ~~REAGENT KITS, METHODS OF PRODUCING ANTIBODIES, AND METHODS OF~~ FOR DETECTING ~~ANALYTES~~ ECSTASY-CLASS DRUGS

RELATED APPLICATIONS

The co-pending and commonly assigned United States Patent Application Serial Number [————————] 10/087,612 for "Compounds, Antibodies, Reagent Kits, Methods of Producing Antibodies, and Methods of Detecting Analytes" (Attorney Reference Number 9793/112) was filed on the same day as the present application and is incorporated herein by reference in its entirety.

BACKGROUND

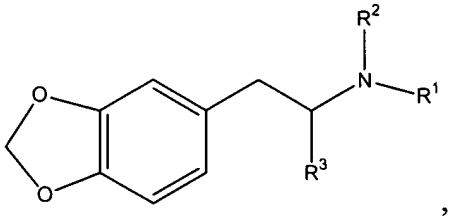
The present invention relates to immunoassays, more particularly, to immunoassays for derivatives of amphetamine, and especially to "ecstasy drugs."

The use and abuse of a class of illicit designer drugs known commonly as "ecstasy drugs" have increased significantly in recent years. These compounds, which are derivatives of amphetamine distinguished by having a fused methylenedioxy-phenyl ring system, include: MDA (3,4-methylenedioxyamphetamine); MDMA also known as "Ecstasy" (3,4-methylenedioxy-N-methylamphetamine); MDEA also known as "Eve" (3,4-methylenedioxy-N-ethylamphetamine); BDB (3,4-methylenedioxyphenyl-2-butanamine); MBDB (3,4-methylenedioxyphenyl-N-methylbutanamine); and MDPA (3,4-methylenedioxy-N-propylamphetamine).

Heretofore, methods for the detection of ecstasy drugs have primarily involved immunoassays originally developed for the detection of amphetamine and/or methamphetamine. The detection of an ecstasy drug by such assays relies on the limited cross-reactivities that may coincidentally exist between the ecstasy drug and the amphetamine and/or methamphetamine antibodies. A positive result obtained by such an assay

~~CLAIMS~~ What is claimed is:

1. (currently amended) A compound having a structure



wherein:

R^1 is –J-M-T;

R^2 is selected from the group consisting of hydrogen, an alkyl group, and a protecting group; and

R^3 is an optionally substituted alkyl group; wherein

J comprises 1-15 carbon atoms and 0-6 heteroatoms;

M is selected from the group consisting of –O–, –CO–, –NR^4–, –S–, –C(=NH)O–, –NH(CO)–, –NH(CO)NH–, –NH(CS)–, –NH(CS)NH–, –O(CO)NH–, –NH(C=NH)–, and maleimidothioether, wherein R^4 is selected from the group consisting of hydrogen and an alkyl group, with the proviso that when M is –O–, T is not H; and

T is selected from the group consisting of hydrogen, a hydroxyl, a leaving group, a macromolecular carrier, and a label;

with the proviso that R^1 is not ~~$-CH_2CN$, $-CH_2C{=}CH_2$, $-CHO$,~~ $-CH_2CH_2OH$, ~~$-CH_2CH_2OCH_3$, or $-CH_2CCH$~~ when R^2 is hydrogen and when R^3 is methyl.

2. (original) The compound of claim 1 wherein the macromolecular carrier is selected from the group consisting of a protein, a polypeptide, and a polysaccharide.

3. (original) The compound of claim 2 wherein the protein is selected from the group consisting of keyhole limpet hemocyanin, bovine serum albumin, and bovine thyroglobulin.

4. (original) The compound of claim 1 wherein J comprises 1-11 carbon atoms.

5. (original) The compound of claim 4 wherein J is $-(CH_2)_k-$ and k is 1, 2, 3, 4, 5, or 6.

6. (original) The compound of claim 5 wherein R^2 is selected from the group consisting of hydrogen, methyl, ethyl, and a protecting group, and R^3 is selected from the group consisting of methyl, ethyl, n-propyl, and n-butyl.

7. (original) The compound of claim 6 wherein k is 3 and M is –CO–.

8. (original) The compound of claim 7 wherein T is a leaving group.

9. (original) The compound of claim 7 wherein R^2 is hydrogen or a protecting group, and R^3 is methyl.

10. (original) The compound of claim 7 wherein T is a leaving group comprising N-oxysuccinimide.

11. (original) The compound of claim 10 wherein R^2 is hydrogen or a protecting group, and R^3 is methyl.

12. (original) The compound of claim 7 wherein T is a macromolecular carrier selected from the group consisting of a hemocyanin, a globulin, an albumin, and a polysaccharide.

13. (original) The compound of claim 12 wherein R^2 is hydrogen or a protecting group, and R^3 is methyl.

14. (currently amended) The compound of claim 9 wherein R^2 is ~~TFA~~ trifluoroacetyl and T is N-oxysuccinimide.

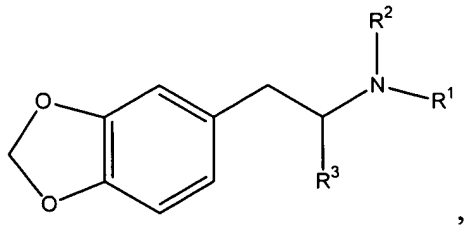
15. (currently amended) The compound of claim 9 wherein R^2 is ~~TFA~~ trifluoroacetyl and T is hydroxyl.

16. (original) The compound of claim 9 wherein R^2 is hydrogen, and wherein T is a polysaccharide or a protein selected from the group consisting of keyhole limpet hemocyanin, bovine serum albumin, and bovine thyroglobulin.

17. (original) An antibody specific for an ecstasy drug.

18. (original) The antibody of claim 17 wherein the ecstasy drug is selected from the group consisting of MDA, MDMA, MDEA, MDPA, BDB, MBDB, and combinations thereof.

19. (currently amended) An antibody ~~specific for an analyte wherein the analyte comprises a~~ produced in response to a compound having the structure



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wherein:

R^1 is –J-M-T;

R^2 is selected from the group consisting of hydrogen, an alkyl group, and a protecting group; and

R^3 is an optionally substituted alkyl group; wherein

J comprises 1-15 carbon atoms and 0-6 heteroatoms;

M is selected from the group consisting of –O–, –CO–, –NR^4–, –S–, –C(=NH)O–, –NH(CO)–, –NH(CO)NH–, –NH(CS)–, –NH(CS)NH–, –O(CO)NH–, –NH(C=NH)–, and maleimidothioether, wherein R^4 is selected from the group consisting of hydrogen and an alkyl group, with the proviso that when M is –O–, T is not H; and

T is ~~selected from the group consisting of hydrogen, a hydroxyl, a leaving group,~~ a macromolecular carrier~~, and a label~~.

20. (original) The antibody of claim 19 wherein the macromolecular carrier is selected from the group consisting of a protein, a polypeptide, and a polysaccharide.

21. (original) The antibody of claim 19 wherein J comprises 1-11 carbon atoms.

22. (original) The antibody of claim 21 wherein J is –$(CH_2)_k$– and k is 1, 2, 3, 4, 5, or 6.

23. (original) The antibody of claim 22 wherein R^2 is selected from the group consisting of hydrogen, methyl, ethyl, and a protecting group, and R^3 is selected from the group consisting of methyl, ethyl, n-propyl, and n-butyl.

24. (original) The antibody of claim 23 wherein k is 3 and M is –CO–.

25. (original) The antibody of claim 24 wherein T is a macromolecular carrier selected from the group consisting of a hemocyanin, a globulin, an albumin, and a polysaccharide.

26. (original) The antibody of claim 24 wherein R^2 is hydrogen or a protecting group, and R^3 is methyl.

27. (original) The antibody of claim 26 wherein T is a macromolecular carrier selected from the group consisting of a hemocyanin, a globulin, an albumin, and a polysaccharide.

28. (original) The antibody of claim 26 wherein R^2 is TFA and T is N-oxysuccinimide.

29. (original) The antibody of claim 26 wherein R^2 is TFA and T is hydroxyl.

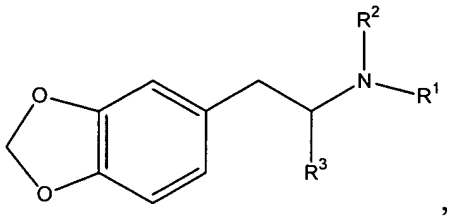
30. (original) The antibody of claim 26 wherein R^2 is hydrogen and T is a protein selected from the group consisting of keyhole limpet hemocyanin, bovine serum albumin, and bovine thyroglobulin.

31. (original) A reagent kit comprising the antibody of claim 17.

32. (original) A reagent kit comprising the antibody of claim 19.

33. (original) A reagent kit comprising the antibody of claim 27.

34. (currently amended) A method of producing an antibody comprising inoculating a host with an immunogen comprising a structure



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wherein:

R^1 is –J-M-T;

R^2 is selected from the group consisting of hydrogen, an alkyl group, and a protecting group; and

R^3 is an optionally substituted alkyl group; wherein

J comprises 1-15 carbon atoms and 0-6 heteroatoms;

M is selected from the group consisting of –O–, –CO–, –NR^4–, –S–, –C(=NH)O–, –NH(CO)–, –NH(CO)NH–, –NH(CS)–, –NH(CS)NH–, –O(CO)NH–, –NH(C=NH)–, and maleimidothioether, wherein R^4 is selected from the group consisting of hydrogen and an alkyl group, with the proviso that when M is –O–, T is not H; and

T is a macromolecular carrier.

35. (original) The method of claim 34 wherein T is selected from the group consisting of hemocyanins, globulins, and albumins.

36. (original) The method of claim 34 wherein J comprises 1-11 carbon atoms.

37. (original) The method of claim 36 wherein J is $–(CH_2)_k–$ and k is 1, 2, 3, 4, 5, or 6.

38. (original) The method of claim 37 wherein R^2 is selected from the group consisting of hydrogen, methyl, ethyl, and a protecting group, and R^3 is selected from the group consisting of methyl, ethyl, n-propyl, and n-butyl.

39. (original) The method of claim 38 wherein k is 3 and M is –CO–.

40. (original) The method of claim 39 wherein R^2 is hydrogen or a protecting group, and R^3 is methyl.

41. (original) The method of claim 40 wherein T is selected from the group consisting of keyhole limpet hemocyanin, bovine serum albumin, and bovine thyroglobulin.

42. (currently amended) A method of detecting an analyte in a sample, the analyte comprising an ecstasy drug or an ecstasy drug derivative, comprising:

contacting the sample with the antibody of claim 17 and a label which is detectable upon binding of the antibody to the analyte;

binding the antibody to the analyte; and

detecting an adduct formed by the antibody and the analyte.

43. (cancelled)

44. (cancelled)

45. (currently amended) A method of detecting an analyte in a sample, the analyte comprising an ecstasy drug or an ecstasy drug derivative, comprising:

contacting the sample with the antibody of claim 18 and a label which is detectable upon binding of the antibody to the analyte;

binding the antibody to the analyte; and

detecting an adduct formed by the antibody and the analyte.

46. (cancelled)

47. (cancelled)

48. (currently amended) A method of detecting an analyte in a sample, the analyte comprising an ecstasy drug or an ecstasy drug derivative, comprising:

contacting the sample with the antibody of claim 19 and a label which is detectable upon binding of the antibody to the analyte;

binding the antibody to the analyte; and

detecting an adduct formed by the antibody and the analyte.

49. (cancelled)

50. (cancelled)